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ABSTRACT

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Technical Report No. 19

THE PRELINGUISTIC COGNITIVE BASIS OF CHILDREN'S COMMUNICATIVE INTENTIONS

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Abstract

The proposal that young children's communicative intentions stem from prelinguistic cognitive abilities is examined in detail. The most developed available formulation of this proposal, that provided by Brown (1973), is evaluated and the evidence in support of it is found to be insufficient. Three crucial problems that must be solved before an acceptable version of the proposal can be formulated are raised. These are: (1) determining prelinguistic cognitive abilities; (2) individuating children's communicative intentions; and (3) finding criteria for determining whether a communicative intention stems from prelinguistic cognitive abilities. Approaches to solving these problems are suggested.

The study of child language has undergone a major change in the last five years. The focus has shifted from the form of children's speech to its functions -- from syntax to what children are trying to communicate when they speak. The major contributors to this transition include Bloom (1970), Bowerman (1973), Schlesinger (1971) and Slobin (1973). The transition itself is best documented by Brown (1973).

A major aim of this recent work has been to delimit the set of entities and relations about which children intend to communicate. Several proposed lists of children's communicative intentions are available, two of which are shown in Table 1 with examples of children's utterances. The first list is from Slobin (1971), who uses the phrase "expressive functions" to refer to this aspect of child language. The second is from Schlesinger (1971). In his model, underlying communicative intentions are mapped onto language via a set of realizational rules. Other such lists can be found in Bloom, Lightbown & Hood (1975), Edwards (1974) and Brown (1973).

Insert Table 1 about here

All of these researchers focus on the period of language acquisition when the child has just begun to produce many two-word utterances. This period, labelled Stage I by Brown, usually begins at about 18 months of age. The discussion here will be limited to Stage I speech.[1]

The communicative intention underlying a child's utterance is determined by the method of rich interpretation (Brown, 1973). This method consists of inferring the child's intended meaning on the basis of the words he says and their order, combined with the situational and linguistic context. The possibility of systematic biases is adult's interpretations of children's

utterances cannot be completely eliminated. However, for the purposes of this paper, the assumption that the method of rich interpretation reliably yields a good approximation to the child's intended meaning will be accepted.

The focus of this paper is the following proposal: Stage I children's communicative intentions stem from prelinguistic cognitive abilities. This proposal has gained general acceptance among researchers of child language. For example, Bloom et al. begin their recent monograph by stating:

> Research in child language to date has resulted in a consensus about the semantics of early two- and three-word speech. [This consensus] is that the semantics of early sentences have to do with ideas about objects that originate in the development of sensorimotor intelligence (1975, p. 1).

In this paper, I will argue that the acceptance of this proposal is premature. The discussion will be divided into three major sections. The first contains a description of the best available formulation of the proposal, that provided by Brown (1973). The second presents a detailed evaluation of Brown's analysis. The third section contains a discussion of some crucial, often ignored, problems which must be solved before an acceptable version of this proposal can be formulated. Some suggestions as to how these problems might be approached are also presented.

I. Brown's Formulation of the Proposal

Roger Brown (1973) presents the most developed available formulation of the proposal that children's communicative intentions stem from prelinguistic cognitive development. His analysis will be summarized in three parts. The first discusses the specific list of Stage I communicative intentions he presents. The second is concerned with the prelinguistic child's cognitive abilities. Brown refers to Piaget's (1952, 1954, 1962)

work to determine prelinguistic children's cognitive abilities. An overview of Piaget's account of sensorimotor (i.e., prelinguistic and presymbolic) development will be presented. The third part discusses how Brown determines whether a communicative intention stems from a particular prelinguistic cognitive ability.

The Set of Stage I Communicative Intentions

Brown's main analysis is based upon 12 corpora of children's spontaneous utterances, ranging from 1½ hours to two full days of speech. Five of these were from children learning American English, three Finnish, two Samoan, one Swedish and one Mexican Spanish. Brown also checked 20 less complete samples of child speech to insure that they did not contain anything inconsistent with his main analysis. Thirteen of these were from children learning American English and one each from French, German, Hebrew, Japanese, Korean, Luo and Russian.

On the basis of these samples, Brown has compiled a tentative list of Stage I communicative intentions, shown with examples of children's utterances in Table 2. Brown suggests that all these meanings may be universal; that is, expressed by all Stage I children no matter what language they are learning. The evidence for universality is much stronger for the major meanings, shown at the top of Table 2, than for the peripheral meanings, shown at the bottom.

Insert Table 2 about here

The major meanings are divided into three operations of reference and seven semantic relations. The operations of reference are nomination, recurrence and nonexistence. Each of these is linked with a few words:

nomination with this, that, see, there and here, recurrence with more and another, and nonexistence with all-gone, no-more and no. These operations have a wide range of application and each occurs very often in Stage 1 speech. The semantic relations are agent-action, action-object, agent-object, action-location, entity-location and possessor-possession.[2] These ten major meanings account for the majority of utterances found in Brown's samples of Stage I speech. Also, each meaning appears in just about every sample. Therefore the evidence for their universality is fairly strong.

Some Stage I utterances express meanings not listed as major meanings because they have a low frequency of occurrence or do not appear at all in some of the samples. Brown lists seven such meanings and notes that they might have been included among the major meanings had there been larger samples of children's speech. These peripheral meanings are instrumental, benefactive, indirect object dative, experiencer, comitative, conjunction and classifactory. Including these among the major meanings would raise the percentage of utterances accounted for but would lower the appearance of universality.

Prelinguistic Cogni[illegible]lities

In order to eval[illegible]ce Brown's proposal, it is necessary to specify the set of prelinguistic cognitive abilities that might form the basis for communicative intentions. Since Piaget provides the most detailed and comprehensive available description of infants' cognitive development, it is to his work that Brown refers:

> A rather short list of propositions and relations (between 8 and 15) will encompass the nonlexical or compositional meanings of the majority of all multimorphemic utterances produced by the Stage I children...and these meanings seem to represent linguistically the

> sensorimotor intelligence which develops, according to Piaget's research, in the 18 months or so which normally precede Stage I (1973, p. 64).

Piaget's view of sensorimotor intelligence is based on his observations of young children's actions, primarily those of his own three children from birth to 18 months of age. The main description of the sensorimotor child are found in three of Piaget's books (1952, 1954, 1962), all originally published at least 30 years ago. Brown's list of communicative intentions stems from a data base consisting of spontaneous utterances of 32 children, ages 19 months to 2 ½ years, learning 12 different languages. We therefore have two independent descriptions of the young child, one of prelinguistic cognitive development and the other of language acquisition. These descriptions were done many years apart by scholars with different aims, theoretical orientations and methods. If these two descriptions fit together as well as Brown suggests -- if they both attribute to the child the same knowledge of the world around him -- we would have an important convergence of independent evidence. Therefore Brown's proposal warrants careful evaluation.

Since Piaget's description of the sensorimotor child is an integral part of Brown's proposal, a brief overview of it will be presented. Those aspects of sensorimotor development directly relevant to particular communicative intentions will be covered in more detail in the next section, when the communicative intentions are discussed individually.

Piaget divides cognitive development into four major periods: sensorimotor, preoperational, concrete operational and formal operational. Only the sensorimotor period, which begins at birth and ends at about 18 months, need be considered here.

According to Piaget, the infant's mental life begins with an undifferentiated world. The new-born infant does not conceive of himself and objects in the environment as independent entities: a given object or person exists for the infant only when it is involved in his actions or perceptions. Since during the first months of life everything is embodied in the activity of the child, "the universe presents neither permanent objects, nor objective space, nor time interconnecting events as such, nor causality external to the personal actions" (Piaget, 1954, pp. xiii-xiv). During the sensorimotor period, there is a "transition from chaos to cosmos" (Piaget, 1954, p. xiii). By the end of this period the child has developed concepts of objects, space, causality and time that are well on their way towards becoming the adult concepts.

Development is characterized by Piaget as the "continuous creation of increasingly complex forms and a progressive balancing of these forms with the environment" (1952, p. 3). By "forms" Piaget means some sort of cognitive structures or internal representations of the world. He usually refers to such constructs as schemata. The child's schemata are balanced with the environment when they enable him to function successfully in his surroundings -- to attain goals, predict the results of actions, and so on. Since the concept of a schema is central to Piaget's theory, it will be described before going on to the processes and stages of development.

A schema is a cognitive structure underlying a sequence of physical or mental actions that form an organized whole. For example, there is a schema of grasping, since grasping consists of a series of actions such as reaching, touching, finger closing, and arm retraction. The defining

characteristic of the sensorimotor stage is that all the schemata involve only physical actions (perceiving is considered to be a physical action by Piaget). Once the child has begun to use symbols and develops mental actions, he has progressed beyond the sensorimotor period.

In order to be a schema, the sequence of actions must be repeatable and recognizable. Flavell writes:

> [An action schema] must have a certain cohesiveness and must maintain its identity as a quasi-stable, repeatable unit. It must possess component actions which are tightly interconnected and governed by a core meaning...it is a schema precisely by virtue of the fact that the behavior components which it sets in motion form a strong whole, a recurrent and identifiable figure against a background of less tightly organized behaviors (1963, p. 54).

Flavell also points out that schemata actually refer to classes of total acts which, although distinct from each other, share common features:

> A schema is a kind of concept, category or underlying strategy which subsumes a whole collection of distinct but similar action sequences. For example, it is clear that no two grasping sequences are ever going to be exactly alike; a grasping schema -- a 'concept' of grasping -- is nonetheless said to be operative when any such sequence is seen to emerge (1963, p. 54).

The processes that account for development throughout all periods are adaptation and organization. Adaptation refers to changes in the child's schemata resulting from interactions with his surroundings. These adaptations enable the child to better predict and cope with his environment. Organization refers to the tendency to combine schemata into higher-order, integrated systems. Piaget describes organization and adaptation as follows:

> They are two complementary processes of a single mechanism, the first [organization] being the internal aspect of the cycle of which adaptation constitutes the external aspect...The 'accord of thoughts with things' and the 'accord of thought with itself' express this dual functional invariant of adaptation and organization (1952, pp. 7-8).

Adaptation is divided into two interrelated processes, assimilation and accommodation. Assimilation is the incorporation of new objects and

experiences into existing schemata. For example, the infant may assimilate all small reachable objects to his grasping schema. Accommodation is the modification of existing schemata as a result of new experiences. For example, the infant may accommodate his grasping schema to larger objects by modifying his actions to use both hands in coordination.

Piaget (1952) discusses in detail six stages of sensorimotor development.[3] The main characteristics of each stage will be mentioned here.

As already noted, the new-born's world is undifferentiated; objects and people exist only as part of the child's activity. It is in this sense that the infant can be called egocentric. The Stage 1 infant shows little behavior other than a few uncoordinated, reflexlike activities -- sucking, swallowing, crying, etc. The first signs of accommodation and assimilation can be found in changes in the infant's sucking behavior during this stage.

The Stage 2 infant is still profoundly egocentric, much more interested in the act of applying schemata than in exploring and comprehending his environment. At this stage, the child's schemata begin to undergo definite alterations as a function of experience. During this stage the first of the circular reactions appear. A circular reaction is a series of repetitions of a sensorimotor behavior. The Stage 2 primary circular reactions are centered on the infant's own body, rather than being directed towards manipulating surrounding objects as the later circular reactions are. A primary circular reaction occurs when an infant happens upon a new experience as a consequent of some act and then tries to recapture the experience by repeating the original movement. For example, the infant may repeatedly direct his thumb to his mouth after having fortuitiously done so at first.

The Stage 3 infant has three new important behavior patterns. One is the secondary circular reaction, which consists of attempts to maintain, through repetition, an interesting change in the environment produced by the child's own action. For example, the child may shake a rattle, be interested by the resulting unexpected sound, and therefore continue to shake it. According to Piaget, the secondary circular readtion is the first sensorimotor analogue to classes. For example, the rattle is seen as an instance of things "to shake and hear noise". It is also an analogue to relations. For example, the child realizes a relationship between how hard he shakes and how much noise is produced.

The second behavior pattern that appears in Stage 3 is motor recognition. The child, confronted by objects which habitually set his secondary circular reactions in motion, limits himself to outlining his customary movements instead of actually performing them. According to Piaget, it is as if the child could not recognize the object without working his schema to some extent.

The third new behavior pattern of Stage 3 consists of the infant attempting to cause from a distant the repetition of interesting spectacles that he did not originally cause. Piaget calls these behaviors "procedures for making interesting spectacles last."

The most important developments during Stage 4 are the coordination of schemata and their application to new situations. Schemata begin to become intercoordinated to form new totalities. The schemata become more mobile and flexible: The infant tries various schemata on unfamiliar objects in order to explore their properties and uses a variety of means to pursue a goal that is not immediately obtainable. This last behavior

is the first evidence of a separation of means and ends for the sensorimotor child. The Stage 4 child also begins to anticipate events that are independent of his own actions.

In Stage 5, the tertiary circular reactions appear. These consist of repetitions of actions with intentional modification in order to explore what will happen. Piaget describes one of Laurent's "experiments in order to see:"

> He grasps in succession a celluloid swan, a box, etc., stretches out his arm and lets them fall. He distinctly varies the positions of the fall. Sometimes he stretches out his arm vertically, sometimes he holds it obliquely, in front of or behind his eyes, etc. When an object falls in a new position...he lets it fall two or three times more on the same place, as though to study the spatial relation; then he modifies the situation. (1962, p. 269).

The Stage 5 child is able to discover new means through active experimentation and can thereby solve problems which demand new and unfamiliar procedures. For example, it is by experimentation during this stage that the child becomes able to manipulate objects of various shapes through the bars of his crib. It is also during this stage that the use of objects as instruments first appears: The child learns to use a stick and other objects to extend his reach and draw objects toward him.

Stage 6 is characterized by the invention of new means through mental combination. The child begins to use symbols and has reached the end of sensorimotor development.

Piaget (1954) traces the six stages of development with regard to the concepts of objects, space, causality and time. Since these concepts are reflected in children's communicative intentions their development will be briefly described.

The object concept is built upon an initial state where there are undifferentiated action-object experiences rather than a concept of objects. In the early stages, the child will not search for a hidden object: The object does not exist for him when outside of his perceptual field. By the end of the sensorimotor period, objects are known to be permanent, substantial, firm in existence even when not directly affecting perception. The child will now search for vanished objects and is able to follow a sequence of invisible displacements (e.g., an object being moved from place to place while hidden by the mover's hand). The child also realizes that he himself and other people are objects existing in space.

According to Piaget, the new-born infant's concept of space consists of a collection of unrelated spaces organized around the major sensorimotor spheres of activity: a visual space, an auditory space, etc. In the early sensorimotor stages there is a practical concept of space which depends upon the infant's perceptions and actions. At this stage there is no distinction for the infant between an object changing its location and changing its state. That is, there is no distinction between moving outside the perceptual field and dissappearing, or between finding and creating. At the end of the sensorimotor period the child conceives of a single objective space in which all objects, including himself and others, are contained and interrelated.

Piaget distinguishes two types of causality. One type appears in the early sensorimotor stages as efficacy, which refers to the infant's sense that feelings of effort and longing are responsible for external happenings.

The second type appears in the early sensorimotor stages as phenomenalism, which refers to the infant's feelings that temporal contiguity between two events means that one caused the other, without regard to spatial contiguity. By the end of the sensorimotor period efficacy has developed into psychological causality, the sense of causing one's own actions through volition and of willing to perform an action before doing so. Phenomenalism develops into physical causality: The child comes to realize that both spatial and temporal contiguity are generally necessary for one object to act upon another. The child also apprehends that himself and others can be both causers and recipients of actions.

Time develops from the infants vague feelings of duration imminent in his actions to the notion of time as a generalized medium, like space, in which the self and others can be located. The child at the end of the sensorimotor period is capable of recalling a temporally ordered set of events, even if his own actions were not involved. However, the concept of time is far from fully developed.

Determining Whether a Communicative Intention Stems from a Prelinguistic Cognitive Ability

The final element necessary to evaluate Brown's proposal is a way of determining whether or not a communicative intention stems from prelinguistic cognitive development. Unfortunately, the meaning of "stems" is very vague and Brown does not provide any well-defined criterion for determining whether a given communicative intention is related to a given cognitive ability. What Brown does provide is a set of examples of prelinguistic cognitive abilities and related communicative intentions. In most of his

examples he determines some of the "intellectual prerequisites" of a Stage I meaning and then finds evidence in Piaget's writings that these are included in the child's cognitive capabilities by the end of the sensorimotor period. These prerequisites are things the child must know about the world in order to use a linguistic construction with the meaning attributed to it by the method of rich interpretation. The following is a complete list of Brown's (1973, pp. 198-201) examples of intellectual prerequisites acquired during the sensorimotor period:

(1) The ability to recognize objects and actions, which is a prerequisite for both nomination and recurrence constructions.

(2) The ability to anticipate objects and actions from naturally occurring signs and to notice when such anticipations are not confirmed. This is a prerequisite for nonexistence constructions.

(3) Knowledge of the world of enduring objects and a single spatial field. This is a prerequisite for linguistic constructions involving location.

(4) The ability to distinguish actions from the objects of actions, and the self from other persons and objects. This is a prerequisite for linguistic constructions involving agents, actions, or objects of actions.

(5) Knowledge of the self and others as potential sources of causality and as recipients of forces. This is a prerequisite for linguistic constructions involving agents, objects of actions, indirect object datives, or experiencers.

Brown also gives two examples of "primitive forms" of meanings. These are sensorimotor action patterns which serve functions similar to later

linguistic constructions. Motor recognition, the performing of an abbreviated form of the usual schema in response to an object, is said to be a primitive form of nomination, since both express recognition. The Stage 3 child's procedures for making interesting spectacles last are regarded as primitive forms of recurrence expressions used as requests.

Brown's procedure for determining whether a communicative intention stems from sensorimotor development seems to require only that there be some general similarity between the cognitive abilities necessary to use the communicative intention and some aspect of sensorimotor intelligence, or between the functions of the communicative intention and a sensorimotor schema. Therefore, in the following evaluation of Brown's proposal, an aspect of sensorimotor intelligence will be considered a precursor to a communication intention if they require similar cognitive abilities of if the functions they serve for the child are similar.

II. An Evaluation of Brown's Proposal

In the analysis presented in this section, the ten major meanings (divided into the three operations and the seven relations), the seven peripheral meanings, and two other possible meanings will be discussed. As already noted, a criterion of similarity that approximates Brown's as well as possible will be used to determine whether Piaget's account of sensorimotor development contains a prelinguistic basis for each meaning.

Operations of Reference

Nomination. The operation of nomination is said to occur when "the presence of the referent [is] made manifest by some action calling attention

to it for members of the communication group" (Brown, 1973, p. 189). Stage I children's nomination utterances consist of an introducer, such as this, that or see, and the name of the referent. The referent can be an object, action, or attribute. However, since most Stage I nomination utterances name objects, only the sensorimotor patterns relevant to the recognition of objects will be discussed here. The recognition of actions will be covered under the agent-action relation; the recognition of attributes under the entity-attribute relation.

Brown views motor recognition as a primitive form of nomination. Motor recognition is the performing of an abbreviated form of the usual schema in response to a familiar object:

> What happens, in effect, is that the child, confronted by objects or sights which habitually set in motion his secondary circular reactions, limits himself to outlining the customary movements instead of actually performing them. Everything takes place as though the child were satisfied to recognize these objects or sights and to make a note of this recognition, but could not recognize them except by working, rather than thinking, the schema of recognition... Thus when seeing a doll which she has actually swung many times, Lucienne limits herself to opening and closing her hands or shaking her legs, but very briefly and without real effort (Piaget, 1952, pp. 185-187).

It is not necessary that the schema be in reduced form to be evidence of recognition. Each time the child applies a schema to an object he recognizes or classifies it:

> The child, in assimilating to these schemata the objects which appear in his field or vision, "recognizes" them through this very act (Piaget, 1952, p. 71).

> The secondary schemata constitute the first outline of classes -- perceiving an object as something to shake, to rub, etc. This is, in effect, the functional equivalent of the operation of classification peculiar to conceptual thought (Piaget, 1952, p. 183).

Piaget's theory attributes to the sensorimotor child the ability to recognize objects and to form concepts of sets of similar objects.[4] These abilities are prerequisite to nomination and therefore there is some sort of sensorimotor basis for nomination constructions. However, in order to demonstrate a strong relationship between nomination and sensorimotor schemata it would be necessary to show that the specific concepts reflected in the child's utterances stem from specific sensorimotor schemata. For example, the child gradually distinguishes a set of objects to which his schema of rolling can successfully apply. If it is this set of objects to which the child latter applies a verbal label, such as ball, then there is a clear sensorimotor precursor to nomination constructions involving this label. Unfortunately, Piaget does not provide any usable criterion for determining what does and what does not constitute a schema. Therefore, it is impossible to determine which of the child's concepts are based on sensorimotor schemata and a strong case that nomination utterances reflect sensorimotor intelligence cannot be supported.

Recurrence. The operation of recurrence is used to comment upon or request the reappearence of an object, person or process. According to Brown, Stage I recurrence utterances refer to or request one of three things: the reappearance of a referent previously present (e.g., More Mommy); the appearance of another instance of a category of which one instance has already been present (e.g., More cookie); or an additional quantity of some mass, some of which has already been present (e.g., More milk).

By combining comments on recurrence with requests for recurrence, Brown has put together two types of utterances that are very different in

terms of their sensorimotor precursors. Recurrence comments and recurrence requests will be discussed separately here.

Recurrence comments are similar to nomination constructions in that the child names either a particular referent or a referent as an instance of a category. The relationship of this ability to sensorimotor schemata has already been discussed. Recurrence comments differ from nomination in that the child is also remarking on the previous presence of the referent (or another instance of the same category). This requires, for one thing, some memory capacity. There are many sensorimotor phenomena which show that the child has the memory capacity required. For example, the Stage 6 child can imitate a model that is no longer present: His imitation must be based on his memory of the model. The child also demonstrates his memory capacity when he follows a series of invisible displacements. In one observation, Piaget places a coin in his hand and then moves his closed hand under three different objects in sequence. The child searches under each object in turn until she finds the coin (1954, p. 79). Clearly, the child remembered the coin being in the hand and the path the hand followed.

Another prerequisite to recurrence comments is a notion of the immediate past: The presence of a dog might result in the child's saying <u>another doggie</u> if he had seen one a few minutes before, but this would be unlikely if he had not seen another dog for a long time. The notion of the immediate past is, of course, closely tied to the memory of recent events and their localization in time. Piaget provides numerous examples of deferred reactions where the child either looks at or acts upon an object, is momentarily distracted, and then returns to his looking or

acting. For example:

> At 0;8(7)[5] Lauret sees his mother enter the room and watches her until she seats herself behind him. Then he resumes playing but turns around several times in succession to look at her again. However there is no sound or noise to remind him of her presence (Piaget, 1954, p. 332).

Piaget writes of this observation:

> When Lauret watches his mother sit down behind him, then returns to the objects which I present to him and then turns around several times, it is apparent that he is capable not only of recognizing her (recognitory memory) but also of locating her in memory at the place she has just occupied in a recent past, in contradistinction to other places where she was seen previously (localization in time)...Such a behavior pattern presupposes an elementary concept of before and after (1954, pp. 332-333).

Piaget therefore attributes to the sensorimotor child both the memory capacity and the temporal concept that are prerequisite to recurrence comments.

The situation is more complicated for recurrence used as a request. Brown regards the sensorimotor child's procedures for making interesting spectacles last as a primitive form of recurrence requests. The sensorimotor behaviors of secondary circular reactions, using another's hand as an intermediary to get an action performed, and searching for hidden objects also bear some resemblance to recurrence requests. The similarities and differences of each of these behaviors and recurrence requests will be examined.

The secondary circular reactions will be considered first since, according to Piaget, they form the basis for the procedures for making interesting spectacles last. There are several defining characteristics of secondary circular reactions: (1) They are attempts to maintain, through repetition of an action, an interesting change in the environment;

(2) The interesting change was originally produced unintentionally by an action of the child; (3) Although the original action was unintentional, the repetitions of it are intentional; (4) Unlike the tertiary circular reactions, there is no systematic variation of the action in order to explore the change in results. An example of a secondary circular reaction follows:

> Laurent, from 0;4(19) knows how to strike hanging objects intentionally with his hand. At 0;4(22) he holds a stick; he does not know what to do with it and slowly passes it from hand to hand. The stick then happens to strike a toy hanging from the bassinet hood. Laurent, immediately interested in this unexpected result, keeps the stick raised in the same position and brings it noticeably nearer to the toy. He strikes it a second time. Then he draws the stick back but moving it as little as possible as though trying to conserve the favorable position, then he brings it nearer to the toy, and so on, more and more rapidly (1952, p. 176).

Secondary circular reactions are similar to recurrence in that the child is trying to get something to recur. However, they differ in several ways. In secondary circular reactions, the child repeats his original action in order to get an event that he caused to recur. When using a verbal request, the child is trying to get someone other than himself to be the agent of the recurrence. Also, the use of a recurrence utterance does not require that the child caused the event he wants repeated.

Brown does not distinguish between the reappearance of an object and the recurrence of an event (i.e., objects undergoing actions). However, this distinction is important when examining the relationship between sensorimotor behaviors and recurrence requests. Both types of requests appear in Stage I speech, but requests for the reappearance of objects are much more frequent. Secondary circular reactions always

involve the repetition of events. Furthermore, in all of Piaget's examples (1952, pp. 157-185), the objects of interest remained in the child's perceptual field from the time of the original activity until the repetition of it. Recurrence requests therefore differ from secondary circular reactions in that they often express a desire for the reappearance of a removed object, while secondary circular reactions always are attempts to get an interesting activity of a still present object to recur.

The procedures for making interesting spectacles last are derived from the secondary circular reactions but differ from them in several ways. These differences make the procedures more similar than secondary circular reactions to recurrence requests. For example, the procedures for making interesting spectacles last apply to events that the child did not originally cause. Like verbal requests, these procedures are attempts to cause recurrence at a distance and the objects involved do not necessarily remain in the child's perceptual field between the original event and the repetition.

The prodecures for making interesting spectacles last differ from verbal recurrence requests in at least two ways. Although in these procedures the child attempts to act upon an object from a distance, he is not trying to use an intermediary to cause the event to recur. According to Piaget, at the stage of development in which these procedures appear the child still conceives of his actions as having the potential to cause recurrence from a distance. The second difference is that, like the secondary circular reactions, the procedures for making interesting spectacles last involve the recurrence of events, not the reappearance of objects. Therefore, these procedures, at best, provide a sensorimotor

precursor only for the small subset of Stage I recurrence requests that involve events.

Another sensorimotor behavior possibly related to recurrence is the use of someone else's hand as an intermediary:

> At 0;8(13) Jacqueline looks at her mother who is swinging a flounce of material with her hand. When this spectacle is over, Jacqueline begins by searching for her mother's hand, places it in front of the flounce and pushes it to make it resume its activity.... At 0;10(30) Jacqueline grasps my hand, places it against a swinging doll which she was not able to set going herself, and exerts pressure on my index finger to make me do the necessary (1952, p. 223).

This behavior has a similarity to verbal recurrence requests not shared by the other action patterns discussed here: The child uses an intermediary to cause the repetition, rather than doing so directly by his own actions. However, as in the two behavior patterns just discussed, the child uses this behavior to get events to recur, not objects to reappear.

One sensorimotor behavior that does involve the reappearance of an object is searching for a hidden object. The Stage 3 child will search for an object only if he was in the process of grasping it when it disappeared. The Stage 4 child will search actively for a hidden object, but will look repeatedly in the first place he found it, even if it was obviously hidden elsewhere later. The Stage 5 child will search for a hidden object where he last saw it. It is not until Stage 6 that the child will be able to find an object that has undergone invisible displacements, as in the example where Piaget placed his hand containing a coin under three objects in sequence and the child searched under each object until finding the coin.

The behaviors involved in searching for hidden objects are similar to recurrence requests in that both are attempts to get an object to

reappear. In other ways, however, this behavior pattern differs from recurrence requests. In Piaget's observations, the sensorimotor child searches for a particular object he has seen hidden, while the Stage I child's recurrence utterances request either the reappearance of a particular object, another instance of a category, or an additional quantity of some mass. Another difference is that in searching behaviors the child attempts to cause the reappearance of the object himself, while in recurrence requests the child requests someone else to cause the reappearance.

Thus, there are separate sensorimotor precursors for the various aspects of the meaning of recurrence requests. The procedures for making interesting spectacles last are precursors to requests for repetitions of events and for attempts to cause actions at a distance. The use of another's hand as an intermediary is a precursor to the use of causal intermediaries. Searching for a hidden object is a precursor to requests for the reappearance of objects.

Nonexistence. Nonexistence is typically expressed in Stage I speech by the combination of a negative operator with a nominal or predicte form. Examples include: No-more noise, no hat, all-gone egg, sun gone and dog away (Brown, 1973, p. 191). Brown notes that nonexistence constructions, like recurrence constructions, are used in Stage I as both comments and requests. In combining nonexistence comments and nonexistence requests, Brown subsumes under one major meaning two meanings that differ in their relationship to sensorimotor intelligence. These two meanings will be separated here.

Stage I children use nonexistence comments to express nonexistence within the referential context (i.e., non-presence), not nonexistence in

an absolute sense. Also, the use of nonexistence constructions does not require that the referent was just present, although this is often the case. What is essential is that the presence of the referent was expected, but did not occur. For example, the child may use a nonexistence construction if a toy is not found in its customary place, even if he had not seen that toy for some time.

Brown states that nonexistence comments require the ability to anticipate objects and actions from signs and to notice when such anticipations are not confirmed. The sensorimotor child shows this ability in what Piaget calls the "recognition of signs and their utilization in prevision" (1952, pp. 247-252). For example:

> From 0;11(15) Jaequeline cries as soon as her mother puts her hat on. This is not due to fear or anxiety as before but due to the certainty of the departure.

Therefore, Piaget attributes to the sensorimotor child the abilities Brown consideres to be prerequisites to nonexistence comments.

Brown does not discuss sensorimotor behaviors that might be precursors to nonexistence requests. Nor does Piaget describe any sensorimotor schemata like "procedures for making uninteresting spectacles disappear." There are no precursors to nonexistence requests in his account of sensorimotor development. However, observations of behaviors functionally equivalent to nonexistence requests are quite common; for example, a child pushing away disliked food. Possible sensorimotor precursors that do not appear in Piaget's account, such as this one for nonexistence requests, will be discussed further in the final section of this paper.

Semantic Relations

Agent-Action, Action-Object & Agent-Object. Since the three semantic relations of agent-action, action-object and agent-object are interrelated, they will be discussed together. Brown describes agent, action and object as follows (The definitions are based on Chafe, 1970). An agent is someone or something which is perceived to have its own motivation force and to cause an action or process. Most agents in Stage I speech are animate, such as Mommy, Adam, bear, I or you, but a few are inanimate, as in Car go. An action is a perceived movement. The child uses terms like come, go, pull, stand up, and write in reference to actions. An object is someone or something either suffering a change of state or simply receiving the force of an action. Objects are usually but not always inaminate and are referred to in Stage I speech by the name of a person or thing or by a pronoun such as it or that.

Sensorimotor precursors to the linguistic expression of agents, actions and objects can be found in Piaget's (1954) description of the development of the concepts of objects and causality.

In Piaget's view of the development of the object concept, the new-born infant does not conceive of objects and his own activity as independent, but knows only object-action amalgams: Objects and other people are conceived to exist only when he is acting upon them. As discussed under recurrence, the child's behaviors in regard to hidden objects provide evidence that he comes to conceive of objects as having a separate, permanent existence. By the end of the sensorimotor period, the child conceives of objects and actions as independent.

As for the concept of causality, Piaget states:

> At first there is no causality for the child other than his own actions; the initial universe is not a web of causal sequences but a mere collection of events arising in extension (1954, p. 220).

Development during the sensorimotor period results in:

> The formation of a universe in which the child's action is located among other causes and obeys the same laws (1954, p. 272).

During Stage 3 of the sensorimotor period the child begins to form a distinction between actions and the results of actions; i.e., between causes and effects:

> Because with prehension and the handling of objects the child's behavior becomes more systematic and consequently more intentional... he will better dissociate the purpose or the desire preceding the result from the action and the result itself. Hitherto cause and effect were, so to speak, condensed into a single mass centered around the effect perceived; the feeling of efficacy was merely one with the result of the act...Henceforth, on the contrary, as a a result of the greater complexity of acts and consequently of their greater purposefulness, cause reveals a tendency to be internalized and effect to be externalized. (Piaget, 1954, pp. 230-231).

The Stage 4 child begins to realize that other people besides himself can function as causal agents. An observation of the child using another's hand as an intermediary has already been cited when discussing recurrence. Of this and similar observations Piaget writes:

> Such facts seem to us to indicate that during this fourth stage the child ceases to consider his own action as the sole source of causality and attributes to someone else's body an aggregate of particular powers (1954, p. 261).

However, at this stage the child seems to regard external sources as causes only when his own actions intervene in some way; e.g., by pushing the other's hand.

During Stage 5 the child comes to know that other people and objects can be causal agents independent of any activity on his part:

> With regard to persons...the child no longer limits himself to starting their activity by pushing their arms, lips, etc.; he places himself in front of them in the position in which they can act upon him or he places in their hands the object upon which he expects them to act, etc. Behavior of this kind indicates the existence of a new attitude; from this time on, the child considers the person of another as an entirely autonomous source of action (Piaget, 1954, p. 276).

It is also during this stage that the child begins to see himself as an entity subject to the same laws of causality as other objects. For example:

> At 1;3(10) Jacqueline, in her playpen, discovers the possibility of letting herself fall down in a sitting position; she holds the bar and lowers herself gently to within a few centimeters of the floor, then lets go of her support. Before this she has not released the bar until she was suitably placed, but from now on she lets herself go, foreseeing the trajectory her movement of falling will follow independently of any activity on her part (Piaget, 1954, p. 291).

Piaget concludes from this and similar observation:

> These few facts of the most commonplace kind converge to show how the child henceforth considers himself dependent on laws external to himself or as submitting to the effect of causes independent of himself (p. 291).

Brown states that semantic relations involving agents, actions, and objects require the ability to distinguish actions from the objects of actions, and the self from other persons and objects, as well as the ability to realize that both the self and others are potential causers of actions and recipients of forces. All of these abilities are attributed to the child in Piaget's writings. Therefore, there are sensorimotor precursors to these meanings. However, as will be discussed later, Piaget also attributes to the child other abilities relevant to causality that are not reflected in Brown's account of Stage I speech.

Action-Location & Entity Location. Children's utterances expressing location state the place of occurrence of an action or the place where an entity is situated. The location is specified either with the name of the place or with the words here or there. Stage I location utterances

generally omit the prepositions, such as at, in, and on, that are obligatory in adult language. The recognition of entities and actions has already been covered. Since the only new element involved in these two semantic relations is the notion of location, they will be discussed together.

Piaget (1954) discusses in detail the development of the concept of the spatial field. In his view, the child's first spatial concept is that of a practical space which, like the child's earliest concepts of objects and causality, is intertwined with his own actions: "Action creates space but is not yet situated in it" (1954, p. 102). Also, in the earliest stage, there is not one unified space but a collection of spaces, each centered around a sense or activity: a visual space, a tactile space, an auditory space, etc. Piaget traces the development of the child's concept of space through an intermediate level of subjective space, which is still closely tied to the child's action, to the more advanced spatial concept which he calls objective space. At this stage the child regards space as a container in which he himself and all objects are located and interrelated. Knowledge of objective space includes the cognitive prerequisites for expressing location.

Brown notes that there is no independent evidence to indicate whether the child intends to express specific relations such as in and on with his location utterances, or if he is just expressing juxtaposition in space, as adults do with the preposition at. According to Piaget, a main aspect in the sensorimotor development of the concept of space is the forming of spatial relations among objects. He provides examples of sensorimotor children moving solid objects in and out of hollow objects and balancing

objects on other objects. He states that this behavior "presupposes or provokes an interest in the spatial interrelations of objects" (1954, p. 192). Piaget attributes to the child knowledge of spatial relations which the child is not credited with intending to express in Brown's application of the method of rich interpretation.

Possessor-Possession. Brown groups two types of possession under the possessor-possession relation, alienable and inalienable. Alienable possession expresses the notion of property; that is, that the possessor has prior rights of use or access to the possession. Alienable possession is expressed in Stage I speech by utterances such as Daddy chair. Inalienable possession expresses a permanent part-whole relationship, e.g., Dog tail. Alienable possessives are much more common in Stage I speedh than inalienable possessives, although both occur.

Inalienable and alienable possession differ greatly in their relationship to sensorimotor intelligence. Inalienable possessives have a sensorimotor precursor in behaviors which show that the child can recognize an object when he sees a part of it. One of Piaget's many relevant observations follows:

> At 0;8(15) Lucienne looks at a celluloid stork which I have just taken away from her and which I cover with a cloth. She does not attempt to raise the cloth to take the toy...But when a part of the stork appears outside the cloth, Lucienne immediately grasps this bit as though she recognized the whole animal.
>
> The proof that this involves a reconstruction of the whole is that not every partial presentation is equally propitious. The head or tail immediately gives rise to a search; Lucienne removes the cloth in order to extricate the animal. But sight of the feet alone arouses great interest although the child does not try to grasp; Lucienne seems not to recognize the stork, or at least to consider it as being changed. These facts cannot therefore be interpreted by saying that the child grasps anything whatever. Moreover, when Lucienne recognizes the stork just by its head or tail she expects to find a whole.

Alienable possession, on the other hand, does not seem related to any sensorimotor action pattern. Edwards (1974) agrees, stating that "in his discussions of sensory-motor intelligence, Piaget has not dealt with any notions of possession of objects by persons" (p. 426). The final section contains further discussion of this problem.

Entity-Attribute. When using utterances expressing the entity-attribute relation, the child specifies "some attribute of an entity which could not be known from the class characteristics of the entity alone" (Brown, 1973, p. 197). Examples of Stage I utterances falling in this class include Little dog, Hot pepper, and Yellow block. Entity-attribute is one of the most reliably reported meanings for Stage I children, appearing in almost every sample Brown reviews. I have been unable to find any possible sensorimotor precursors to this meaning in Piaget's writings.

Peripheral Meanings

Instrumental. The instrument is something which the agent uses, e.g., the key in John opened the door with the key. Piaget traces the development of the child's use of instruments (1952, pp. 297-305). In his description of "the behavior pattern of the stick" he clearly attributes a notion of instruments to the sensorimotor child. For example, by 1;3(12) Jacqueline has mastered using a stick to obtain objects that she could not reach from her crib otherwise:

> She discovers the possibility of making objects slide on the floor by means of the stick and so drawing them to her; in order to catch a doll lying on the ground out of reach, she begins by striking it with the stick, then, noticing its slight displacement, she pushes it until she is able to attain it with her right hand (Piaget, 1952, p. 301).

Conjunction. The instances of conjunction in Stage I speech name present objects. The possibility that the recognition of individual objects is related to sensorimotor schemata has already been discussed. Assuming this relationship, conjunction has a sensorimotor precursor in the child's interrelating of individual schemata; i.e., the Stage 4 child's coordination of schemata.

Indirect Object Dative. The indirect object dative is the recipient of an object or message, e.g., Bill is the indirect object dative in John gave the book to Bill. As discussed under the semantic relations involving agents, actions and objects, by the end of the sensorimotor period the child is aware that both he himself and others can be causal agents and objects of actions. However, Piaget does not explicitly attribute to the child any distinction like that between recipients (expressed grammatically by indirect objects) and other types of objects of actions (expressed grammatically by direct objects). Therefore this meaning does not have a clear-cut sensorimotor precursor.

Experiencer. The experiencer is the animate being who is said to be having a mental experience. Edwards (1974) divides experiencer utterances into three types, depending on whether they describe perceptions (e.g., John heard a voice), cognitions (e.g., John knew the answer), or reactions (e.g., John liked the play). He suggests that Stage I children do not intend to express experiencer meanings, and that their utterances that appear to express such meanings are actually either possessive requests (e.g., Helen want) or locatives expressed by verbs such as see or look.

Piaget considers the act of perceiving to be a sensorimotor action. He also credits the child with awareness of his own volition. Perhaps

these are precursors to the child's linguistic expression of his own mental experience of perception and cognition. Piaget does not describe the sensorimotor child coming to realize that other people have internal mental experiences just as he does. Therefore a precursor to utterances about other people's mental experiences is lacking.

Classificatory. Utterances expressing classification name a member of a category and the category itself (e.g., Rover dog, Mommy lady). Apparently Stage I children do not express subset-superset relations (e.g., Dog animal, in the sense of dogs are animals).

Piaget's (1962, pp. 224-226) position seems to be that the sensorimotor child does not have the ability to distinguish between recognizing an object as a particular entity and recognizing an object as an instance of a category. That is, Nelson (1974) is in accordance with Piaget's view when she writes:

> Conceptualizing a single object in its various transformations through time and space may involve the same processes as conceptualizing a set of objects (p. 276).

According to Piaget, the sensorimotor child does not distinguish between recognizing and classifying. Therefore, there is no sensorimotor precursor for expressing that a referent is a specific entity and that this entity is a member of a specified category. When using utterances that have been interpreted as expressing this meaning, perhaps the child is simply giving two names for a single object without intending to express any relationship between the names.

Benefactive. The benefactive is the person on behalf of whom an action is performed. This differs from the object of an action in that the benefactive is not necessarily directly involved in the action. For example,

Mary is the benefactive in Bill bought the milk for Mary. This meaning has some of the intellectual prerequisites already discussed for other meanings, such as knowledge of agents and actions. However, I have been unable to find a sensorimotor precursor to the "for the benefit of" component that is specific to this meaning.

Comitative. The comitative specifies the person accompanying the subject of the verb. This person must also be taking part in the action named by the verb. Usually the word with precedes the comitative, as in John left with Pete. Some of the components of this meaning, such as other people being agents, are identical to those already discussed. However, I have been unable to find a sensorimotor precursor for the "with" component that is specific to this meaning.

Other Possible Meanings

An important question is whether there are other possible meanings besides those on Brown's list. Brown provides a partial list of things Stage I children do not talk about, including past and future events, conditional and hypothetical statements, causality, varieties of spatial relations, number, and some aspects of time. The intellectual prerequisites for some of these possible meanings are acquired during the sensorimotor period. That is, there are sensorimotor schemata that have the potential of being represented in Stage I speech but are not reflected in any of the meanings on Brown's list. It has already been mentioned that Piaget attributes to the sensorimotor child knowledge of some spatial relations, such as in and on. However, in Brown's application of the method of rich interpretation the Stage I child is not credited with intending to express

these relations. Two other possible meanings which would be assigned clear-cut sensorimotor precursors if they were expressed in Stage I speech are discussed below.

Action-Result. There is no meaning on Brown's list that expresses an action and its result. This relationship could be easily expressed in two-word speech by utterances such as Push fall, Throw break, etc. However, it does not seem to appear.

Piaget traces in detail the development of the distinction between action and results (or, in his terms, means and ends). This distinction first appears in Stage 4, when the child begins to coordinate his schemata in various ways. Piaget's criterion for the existence of this distinction is that the child attempts to attain a goal via one means, fails, and then tries an alternative means for obtaining the same goal, as in the following observation:

> At 0;8(20) Jacqueline tries to grasp a cigarette case which I present to her. I then slide it between the crossed strings which attach her dolls to the hood. She tries to reach it directly. Not succeeding, she immediately looks for the strings which are not in her hands and of which she only saw the part in which the cigarette case is entangled. She looks in front of her, grasps the strings, pulls and shakes them, etc. The cigarette case then falls and she grasps it (1952, p. 215).

Event-Time. Brown's list does not include any expression of temporal relations. Apparently the Stage I child does not use words like before, after, later, etc. However, as discussed under recurrence, the sensorimotor child develops elementary concepts of before and after.

Summary. Table 3 summarizes the results of the evaluation of Brown's proposal. The table lists meanings and some intellectual prerequisites

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Insert Table 3 about here

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on the left and sensorimotor precursors on the right. Starting with the major meanings, those which have clear-cut sensorimotor precursors are: recurrence comments, nonexistence comments, agent-action, agent-object, action-object, inalienable possession, action-location and entity-location. These are marked by + in Table 3. Partial or less clear-cut precursors were found for nomination and recurrence requests, marked by ? in the table. No precursors were found for nonexistence requests, alienable possession and entity-attribute, marked by -. Among the peripheral meanings, precursors were found for instrumentals, conjunctions and some types of experiencers, but not for the other four.

At least two other possible meanings, action-result and event-time, have sensorimotor precursors, but fail to appear on Brown's list. Some aspects of sensorimotor intelligence might be reflected in language later than others if their expression requires linguistically more complex forms. However, I know of no measure of complexity that would differentiate these last two meanings from the others. Nor can they be differentiated in terms of their usefulness to the child.

Overall, Brown's list of Stage I communicative intentions does not directly reflect sensorimotor intelligence: Some of the meanings have sensorimotor precursors while others do not; some possible meanings have sensorimotor precursors but do not appear on his list.

What conclusion should be drawn from the lack of a complete match between Brown's communicative intentions and Piaget's account of sensorimotor intelligence? One possibility is that communicative intentions arise in vacuo. This possibility leads to one of two alternatives: either the communicative intentions expressed in early language are completely

independent of non-linguistic cognitive development or we must resurrect Watson's notion that speech precedes thought. Both of these seem unlikely, especially in light of recent work on prelinguistic and one-word communication (Carter, 1975; Bloom, 1975; Greenfield, Smith, & Laufer, in press).

Another possibility is to accept that there is a prelinguistic cognitive basis to early communicative intentions and conclude that one or more of the elements that went into the preceding analysis were not completely correct. The analysis was based upon three elements: the set of Stage I communicative intentions given by Brown, the set of sensorimotor cognitive abilities described by Piaget, and the criterion of general similarity used to determine whether members of these two sets are related. The final section of this paper contains a discussion of problems with each of these elements and some suggestions of approaches to solving these problems.

III. Unsolved Problems

The most obvious problem is the criterion of general similarity used to determine whether a communicative intention stems from sensorimotor abilities. However, it is important to note that no one has offered a better criterion. The criterion of general similarity is somewhat unreliable: Someone else attempting the same type of analysis as presented in the previous section would probably not arrive at exactly the same precursors for every meaning. However, it seems unlikely that there would be changes in the final conclusion that some of the communicative intentions have sensorimotor precursors in Piaget's descriptions, others do not, while some are unclear cases.

A more crucial problem is that the criterion of general similarity may be misleading: A prelinguistic cognitive ability may seem similar to a communicative intention without actually being part of its prelinguistic cognitive basis. With the current state of knowledge, there is little information available to insure against this possibility. To do so, longitudinal studies seem necessary. In order to determine whether a communicative intention is actually based on a sensorimotor ability, it would be helpful to know such things as the following:

(1) Do all children exhibit evidence of the sensorimotor ability before the communicative intention appears?

(2) Is there a correlation between the age of appearence of the sensorimotor ability and the age of appearence of the communicative intention?

(3) Are there similarities in the situations in which the sensorimotor ability is manifested and in which the communicative intention is produced? In particular it would be of interest to know whether in situations where the child's verbal utterance does not get him what he wants, the child then uses the sensorimotor action pattern. Information about this last question could easily be determined by failing at times to respond appropriately to utterances expressing a certain communicative intention.

A second problem concerns the set of prelinguistic cognitive abilities. For the preceding analysis, Piaget's descriptions were assumed to be both correct and complete. However, when discussing nonexistence requests it was noted that there exists a possible prelinguistic precursor that does not appear in the set of sensorimotor action patterns Piaget describes. Suppose we assume that Piaget's descriptions of the sensorimotor child are essentially correct but not complete. Can precursors for the communicative

intentions lacking them in Table 3 be found in other observations?

One meaning lacking a precursor is alienable possession. Perhaps a precursor to this meaning can be found in the situation where one child plays with another child's toy. Any indication that the child realizes someone else has a prior right to the toy would be evidence of a primitive notion of possession. The child bringing someone something belonging to them would also be behavioral evidence of a notion of possession.

The other major meaning lacking a precursor in Piaget's descriptions is entity-attribute. The attributes children talk about are perceptual, things like big, red, etc. It therefore would be difficult to find evidence in sensorimotor behaviors of knowledge of these attributes. However, perhaps 18 month old children can be shown to group objects (or, more likely, pairs of objects) on the basis of attributes such as those Stage I children name.

Therefore, all of Brown's major meanings have possible precursors in prelinguistic intelligence.[6] Observations of sensorimotor children in which the observer looks specifically for precursors to particular meanings might resolve whether these possible precursors are the actual basis of the communicative intentions.

The remaining problem lies in determining what constitutes a Stage I communicative intention. That is, what is the criterion for individuating Stage I communicative intentions? Examples of this problem can be found by comparing the two lists of communicative intentions shown in Table 1. For example, Schlesinger places possessives (e.g., my book) under the modifier + head relation, while Slobin separates possessives and modifiers into

two separate communicative intentions. Other examples can be found in the analysis presented in Section II. For that analysis it was necessary to subdivide three of Brown's major meanings: recurrence into recurrence comments and recurrence requests, nonexistence into nonexistence comments and non-existence requests, and possessives into alienable possessives and inalienable possessives. The important question is: Which of these alternative divisions of communicative intentions best characterizes Stage I children's knowledge? Since it determines the set of meanings that precursors are needed for, the procedure for individuating meanings can determine whether or not precursors will be found. That is, the criterion used can largely determine the outcome of an analysis such as that presented in Section II.

Individuating communicative intentions is also a crucial problem for another important proposal about early language; the proposal of universality. This proposal states that the same set of communicative intentions are expressed by all Stage I children, no matter what language they are learning (Brown, 1973). Clearly, one could formulate a set consisting of a few very general meanings which would all be found in any sample of child speech. Alternatively, one could formulate a set consisting of many very specific meanings, few of which would appear in any given sample of child language. Therefore, without a justified criterion for individuating meanings, the proposal of universality is vacuous.

Looking at Brown's possessor-possession meaning will clarify this problem. For the preceding analysis, this was divided into two meanings, alienable and inalienable possession. The corpora of four children's utterances provided by Bloom et al. (1975) contains 73 Stage I possession

utterances. Seventy of these expressed alienable possession and only three expressed inalienable possession. Therefore, depending on whether or not these meanings are combined, we either have one meaning that appears frequently, or two meanings, one of which is frequent and the other rare. If considered to be a separate meaning, inalienable possession could not be counted as universal.

The general problem can be described as follows. There are two meanings, X and Y, that can be distinguished by adults. When characterizing the child's knowledge of language, we wish to determine whether X and Y should be combined into one communicative intention or separated into two. The question is: What type of criteria might be used for individuating children's communicative intentions? Linguists who distinguish the communicative intentions in adult language, such as Chafe (1970), use adult intuitions and look for various types of syntactic distinctions. Clearly, criteria of this sort cannot be used at the early stages of language acquisition.

There are, however, three independent kinds of evidence that can be used to determine whether or not X and Y should be combined. The first is whether or not X and Y first appear in children's speech at about the same time. If, for example, X generally appears after Y, we have evidence that X and Y do not form one communicative intention. The second kind of evidence is whether X and Y stem from the same or different aspects of sensorimotor intelligence. If they have different sensorimotor precursors, we again have evidence that X and Y do not form one communicative intention for the child. The third kind of evidence requires looking at a slightly later stage of language acquisition. If soon after Stage I the child

acquires a more advanced form of expressing X, but does not use this form to express Y, we have evidence that he distinguishes X and Y. This is based on Slobin's (1973) general principle that new forms express old functions (functions = communicative intentions). The use of a new form to express an old function may enable us to determine how inclusive that function was.

The information necessary to apply these criteria to all the possible cases is not available, but some examples of their application can be given. Looking at the possessive and locative cases, and again using the corpora provided by Bloom et al. (1975), we find that alienable possession appears before inalienable possession, while entity-location and action-location utterances appear at about the same time. On the second bit of evidence, the two types of possession do not have similar sensorimotor precursors, while the two types of locatives overlap in their sensorimotor precursors (see Table 3). Therefore it seems that alienable and inalienable possession should be divided into two communicative intentions, while entity-location and action-location should be combined into one.

I do not have the information necessary to apply the third criterion to these examples. That is, for example, I do not know if when the child starts using the possessive inflection, he applies it to both alienable and inalienable possessives at about the same time. However, the information needed to apply this criterion is available for another example. As already noted, Schlesinger groups attribute-entity and possessor-possession utterances under a single communicative intention, which he calls modifier + head. Both Brown and Slobin separate these into two separate communicative intentions. Soon after Stage I the child begins to reliably use the

possessive inflection -- to say Mommy's lunch instead of Mommy lunch. Since the child does not use this inflection with attributes, we have evidence that he distinguishes possessives from attributes, we have soon after Stage I.

Three logically independent criteria for determining whether or not two possible communicative intentions should be combined have been suggested. These criteria involve the time of appearence of the candidate communicative intentions, the overlap in their sensorimotor precursors and the development of the forms used to express the intentions after Stage I. If these three converge -- that is, if they each lead to the same way of individuating communicative intentions -- they would seem to provide reasonable criteria. Whether or not they will converge is yet to be determined.

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Footnotes

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[1]The interested reader is referred to the work of Greenfield, Smith & Laufer (in press) and Bloom (1973) on the communicative intentions expressed in one-word speech, and to Carter (1975) for work on prelinguistic communication.

[2]Brown also discusses a demonstrative-entity relation. However, since in his final analysis it is subsumed under nomination, it is excluded here.

[3]Stages 1, 2, 3, 4, 5, and 6 refer to Piaget's stages of sensorimotor development. Stage I (roman numeral) refers to Brown's first stage of language acquisition.

[4]Whether the child distinguishes between recognizing a particular object (e.g., when he says See Rover in reference to a dog he knows) and recognizing an object as a member of a category (e.g., when he says See doggie in reference to a dog he has never seen before) will be discussed under the classificatory meaning.

[5]The notation x;y (z) designates x years, y months and z days of age.

[6]In order to avoid a great many more details, the peripheral meanings will not be discussed further.

Table 1: Sample Lists of Children's Communicative Intentions

Slobin's Expressive Functions

Locate, Name:	there book, that car
Demand, Desire:	more milk, give candy
Negate	
Nonexistence:	no wet (meaning "dry")
Rejection:	no wash (meaning "don't wash me")
Denial:	no girl (denying preceding assertation)
Describe Event	
Agent-Action:	Bambi go
Action-Object:	hit ball
Agent-Object:	Momma bread
Locative:	Baby highchair
Instrumental:	cut knife
Dative:	throw Daddy (meaning "throw it to Daddy")
Indicate Possession:	My shoe, mamma dress
Modify, Qualify:	pretty dress, big boat
Question	
Wh-questions:	where ball
Yes-no Questions:	(marked by rising intonation on any utterance)

Schlesinger's Underlying Intentions

A. Operations	
Negation + X:	no wash, no water
X + Dative	throw Daddy (meaning "throw it to Daddy")
Introducer + X:	see boy, it ball
X + Locative:	sat wall, baby highchair
B. Relations	
Agent + Action:	Bambi go, airplane by
Action + Object:	pick glove, want more
Agent + Object:	Eve lunch, Mommy sandwich
Modifier + Head:	pretty boat, my book

Table 2: Brown's Communicative Intentions of Stage I Speech

I. Major Meanings	
A. Operations of Reference	
Nomination:	that book, there clown
Recurrence:	more milk, another swing
Nonexistence:	all-gone juice, no-more dog
B. Semantic Relations	
Agent - Action:	Adam put, Eve read
Agent - Object:	Mommy sock, Mommy lunch
Action - Object:	put book, hit ball
Entity - Location:	sweater chair, book table
Action - Location:	walk street, go store
Possessor - Possession:	Adam checker, Mommy lunch
Attribute - Entity:	big train, red book
II. Peripheral Meanings	
Instrumental:	sweep broom
Benefactive:	for Daddy
Indirect Object Dative:	give me book
Experiencer:	Adam see
Comitative:	Go mommy (meaning "go with Mommy")
Classificatory:	Mommy lady
Conjunction:	Kimmy Phil (names present objects)

Table 3: Stage I Communicative Intentions & Their Sensorimotor Precursors

Major Meanings	Precursors
? Nomination	
recognition of objects and events	schemata of recognition & classification (doesn't account for specific concepts)
+ Recurrence Comments	
recognition	see nomination
memory	deferred imitation and following a series of invisible displacements
notion of immediate past	deferred reactions
? Recurrence Requests	
recurrence of events	secondary circular reactions, prodedures for making interesting spectacles last, using another's hand as an intermediary
reappearence of objects	searching for a hidden object
+ Nonexistence Comments	
expectation	recognition of signs and their utiliazation in prevision
- Nonexistence Requests	
Agent - Action +Agent - Object Action - Object	development of concepts of objects and causality
+ Inalienable Possession	
part-whole concept	searching for the whole object when only a part is visible
-Alienable Possession	
property	
-Attribute - Entity	
Action - Location +Entity - Location	development of concept of the spatial field

Table 3 continued

Peripheral Meanings	Precursors
+ Instrumental	behavior of the stick
- Benefactive	
- Indirect Object Dative	Not distinguished from other objects of actions
? Experiencer	Awareness of own volition, but no mention of children realizing that others have mental experiences
- Comitative	
- Classificatory	
+ Conjunction	coordination of schemata

Other Possible Meanings	
Action - Result (e.g., push fall)	distinction between means and ends
Event - Time (e.g., eat before)	deferred reactions

Key

+ clear-cut sensorimotor precursor

- no sensorimotor precursor

? unclear case